

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Boyle Docket No.: EPC-014
Serial No.: 10/565,928 Art Unit: 2821
Filed: January 20, 2006 Examiner: Dieu Hien Duong
Title: Tuning Improvements in "Inverted-L" Planar Antennas

Commissioner for Patents
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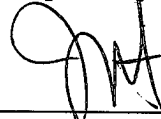
INFORMATION DISCLOSURE STATEMENT

Dear Sir:

The Applicant wishes to bring to the attention of the U.S. Patent and Trademark Office the information noted on the enclosed forms PTO/SB/08a & 08b, which may be considered material to the examination of the above-identified application. Applicant has included copies of the foreign patents and non-patent literature.

This Information Disclosure Statement is submitted under 37 C.F.R. §1.97(d) together with the \$180.00 fee set forth in 37 C.F.R. §1.17(p) as this disclosure is being filed after final action or notice of allowance, whichever occurs first, but before payment of the issue fee. As required under 37 C.F.R. §1.97(e), Applicants hereby state that each item of information contained in the Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application, not more than three months prior to the filing of the statement. A copy of the translation of the Japanese Office Action has been provided for the Examiner's convenience. Please charge the required fee of \$180.00 and any additional amount, or credit any overpayment to Deposit Acct. No. 50-1065 of the below mentioned firm.

Respectfully submitted,



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3/5/10
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(Translation of Official Action)
NOTIFICATION OF REASON FOR REJECTION

Mailed: January 26, 2010

Indication of Case: Japanese Patent Application No. 2006-520934

It is concluded that the present application should be rejected for the following reason. If the applicant has any argument against the reason, an Argument must be filed within three months of the mailing date of this Official Action.

REASON 1:

It is considered that the invention(s) claimed in the following claims of the present application should not be granted a patent under Article 29, paragraph 2 of the Patent Law since the subject matter thereof could have been easily made by those skilled in the art to which the invention pertains on the basis of the invention(s) described in the publication(s) mentioned below which was(were) distributed in Japan or elsewhere or the invention(s) made available to the public through electric telecommunications prior to the filing of the present application.

NOTE:

List of Citations

1. Japanese U.M. Laid-Open Pub. No. 113516/1991
2. Japanese Patent Laid-Open Pub. No. 245705/1989
3. Japanese Patent Laid-Open Pub. No. 2003-92510
4. Koizumi, "Method of Designing Filter for High-Frequency Band", Transistor Gijutsu Magazine, February 1988, pp.403 - 412

Claims 1 - 11 are rejected as being obvious over Citations 1 - 4.

Re: Claim 1

Citation 1 (Figs. 1 and 2 and page 3, line 10 - page 5, the last line) discloses an invention of a planar antenna assembly including: a ground plane (2); a patch antenna (1); means (8) for mounting the patch antenna (1) such that it is spaced from the ground plane (2); and a feed (4) for coupling the patch antenna (1) to rf circuitry, the feed having components (6, 7) for reactively tuning the antenna (1). (Reference is made to Claim 1 of the present application, but the reference numerals in the parentheses are those in the drawings of Citation 1.)

Furthermore, the feature "tuning a relatively lower frequency inductively" in Claim 1 corresponds to the feature of the invention disclosed in Citation 1 that an inductor (13) constituting an equivalent circuit (14) of the inverted F antenna is tuned to the capacitor (7), and the feature "tuning a relatively higher frequency capacitively" in Claim 1 corresponds to the feature of the invention disclosed in Citation 1 that a capacitor (12) constituting the equivalent circuit (14) of the inverted F antenna is tuned to the inductor (6).

Thus, the invention defined by Claim 1 and the invention disclosed in Citation 1 are different from each other in the following respect, and identical with each other in the other respects.

[Difference]

With respect to the ground plane structure, the invention defined by Claim 1 includes "a printed circuit board (PCB) having rf circuitry on the ground plane," while the invention disclosed in Citation 1 has an earth plate.

However, in the technical field of planar antenna assemblies, it is a well-known technique to form a ground plane of "a printed circuit board (1) having rf circuitry on the ground plane" as disclosed in Citation 2 (Figs. 6 – 9, page 3, upper left column, line 11 – lower left column, line 7). The effect of the invention defined by Claim 1 would also have been expected by those skilled in the art based on the inventions disclosed in Citations 1 and 2.

Thus, it is considered that those skilled in the art would have easily replaced the ground plane structure of Citation 1 with the ground plane structure of Citation 2, thereby arriving at the invention defined by Claim 1.

Re: Claim 2

Citation 1 discloses that "the components include a series connected, parallel L-C network (15)."

Re: Claim 3

Citation 1 discloses an invention of a communications apparatus including a housing containing a ground plane (2), a planar antenna (1) spaced from the ground plane, a dielectric (air: with no reference numeral) between the ground plane and the planar antenna, and a feed (4) coupling the planar antenna (1) to rf circuitry, the feed having components (6, 7) for reactively tuning the antenna (1). (Reference is made to Claim 1 of the present application, but the reference numerals in the parentheses are those in the drawings of Citation 1.)

Furthermore, the feature "tuning a relatively lower frequency inductively" in Claim 3 corresponds to the feature of the invention disclosed in Citation 1 that the inductor (13) constituting the equivalent circuit (14) of the inverted F antenna is tuned to the capacitor (7), and the feature "tuning a relatively higher frequency capacitively" in Claim 3 corresponds to the feature of the invention disclosed in Citation 1 that the capacitor (12) constituting the equivalent circuit (14) of the inverted F antenna is tuned to the inductor (6).

Thus, the invention defined by Claim 3 and the invention disclosed in Citation 1 are different from each other in the following respect, and identical with each other in the other respects.

[Difference]

With respect to the ground plane structure, the invention defined by Claim 3 includes "a printed circuit board (PCB) having rf circuitry on the ground plane," while the invention disclosed in Citation 1 has an earth plate.

However, in the technical field of planar antenna assemblies, it is a well-known technique to form a ground plane of "a printed circuit board (1) having rf circuitry on the ground plane" as disclosed in Citation 2 (Figs. 6 – 9, page 3, upper left column, line 11 – lower left column, line 7). The effect of the invention defined by Claim 3 would also have been expected by those skilled in the art based on the inventions disclosed in Citations 1 and 2.

Furthermore, Citation 3 (Attorney's Note: Citation 3 corresponds to U.S. Patent No. 6,774,849) discloses a communications apparatus including a planar antenna.

Thus, it is considered that those skilled in the art would have easily replaced the ground plane structure of Citation 1 with the ground plane structure of Citation 2, and then used the obtained invention in the communications apparatus disclosed in Citation 3, thereby arriving at the invention defined by Claim 3.

Re: Claims 4 and 5

The components (6, 7) of the invention disclosed in Citation 1 "are carried by the planar antenna," and "are mounted on the PCB."

Re: Claim 6

The invention disclosed in Citation 1 is an inverted F antenna (PIFA). Those skilled in the art would have easily replaced the PIFA with a PILA.

Re: Claim 7

Citation 1 discloses "a series connected, parallel L-C network (6, 7)."

Re: Claim 8

Citation 4 discloses, in Figs. 5 and 6, that for example, a one-end-short-circuited $\lambda/4$ wavelength line or one-end-opened $\lambda/2$ wavelength line is equivalent to the "parallel L-C network (6, 7)" disclosed in Citation 1.

Thus, it is considered that those skilled in the art would have easily replaced the parallel L-C network disclosed in Citation 1 with a transmission line in accordance with the invention disclosed in Citation 4.

Re: Claim 9

Since the invention disclosed in Citation 2 relates to an rf module, it is considered that those skilled in the art would have easily arrived at the invention defined by Claim 9 by replacing the ground plane structure disclosed in Citation 1 with the ground plane structure disclosed in Citation 2.

(See the Examiner's remarks with respect to Claim 3.)

Re: Claim 10

Citation 1 discloses that "the components are carried by the planar antenna."

Re: Claim 11

Citation 1 discloses that "the components include a series connected, parallel L-C network (6, 7)."

REASON 2:

The present application should be rejected under Article 36, paragraph 6, sub-paragraph 2 on the grounds that the recitation of the claim(s) is incomplete in the following respects.

NOTE:

Claims 1, 3 and 9 are objected to as being indefinite.

(1). The meanings of the phrases "a relatively lower frequency" and "a relatively higher frequency" are unclear.

(2). The meanings of the phrases "tuning ... inductively" and "tuning ... capacitively" are unclear. (It is considered that when tuning is performed, the reactance is approximately zero.)

In case any additional reason for rejection is found, a further Official Action will be issued.

Background Art Information

Field of Search: IPC H01Q 13/08, H01Q 1/24

References found: (None)

The prior art made of record and not relied upon is considered pertinent to the applicant's disclosure.